DOING SCIENCE: THE PROCESS OF SCIENTIFIC INQUIRY

Washington, D.C. Science Learning Standards: Grades 6, 7, 8

Grade 6

Lesson	Standard	Description
All lessons	**6.1.1**	Give examples of different ways scientists investigate natural phenomena and identify processes all scientists use, such as collection of relevant evidence, the use of reasoning, the development and testing of hypotheses, and the use and construction of theory in order to make sense of the evidence.
All lessons	**6.1.2**	Plan and conduct simple investigations based on student-developed questions that pertain to the content under study, and write instructions others can follow in carrying out the investigations.
All lessons	**6.1.3**	Identify dependent and independent variables in those investigations that have controls. And, if no controls are used, explain why.
All lessons	**6.1.4**	Recognize and explain that hypotheses are valuable even if they turn out not to be true, but that many investigations are not hypothesis driven.
All lessons	**6.1.5**	Write a report of an investigation that includes the problem to be solved, the methods employed, the tests conducted, the data collected or evidence examined, and the conclusions drawn.
3	**6.1.6**	Locate information in reference books, back issues of newspapers and magazines, CD-ROMs, and online databases.
All lessons	**6.1.7**	Draw conclusions based on scientific evidence, and indicate whether further information is needed to support a specific conclusion or to discriminate among several possible conclusions.
3, 4	**6.1.8**	Record and organize information in simple tables and graphs, and identify relationships they reveal. Use tables and graphs as examples of evidence for explanations when writing essays or writing about lab work, fieldwork, etc. Read simple tables and graphs produced by others, and describe in words what they show.
3, 4	**6.2.1**	Explain that computers have become valuable in science because they speed up and extend people's ability to collect, store, compile, and analyze data, prepare research reports, and share data and ideas with investigators all over the world.
3, 4	**6.2.2**	Explain that technology is essential to science for such purposes as measurement, data collection, graphing and storage, computation, communication of information, and access to outer space and other remote locations.

Grade 7

Lesson	Standard	Description
1, 3, 4	**7.1.1**	Explain that when similar investigations give different results, further studies may help to show whether the differences are significant.
All lessons	**7.1.2**	Explain why it is important in science to keep honest, clear, and accurate records.

2, 3, 4	**7.1.4**	Recognize testable hypotheses in investigations that pertain to the content under study, and write instructions others can follow in carrying out the investigation.
All lessons	**7.1.5**	Communicate the steps and results from an investigation in written reports and verbal presentations.
3, 4	**7.1.6**	Incorporate circle charts, bar and line graphs, diagrams, scatter plots, and symbols into writing, such as lab or research reports, to serve as visual displays of evidence for claims and/or conclusions.
1, 3, 4	**7.1.7**	Recognize whether evidence is consistent with a proposed explanation, and know that different explanations can be given for the same evidence and that partial evidence may be exploited for reasons other than truth seeking.
3	**7.7.8**	Recognize that the environment may contain dangerous levels of substances that are harmful to human beings. Therefore, the good health of individuals requires monitoring the soil, air, and water as well as taking steps to keep them safe.
Grade 8		
Lesson	**Standard**	**Description**
1, 3, 4	**8.1.1**	Describe how scientific knowledge is subject to modification and refinement as new information challenges prevailing theories.
1, 3, 4	**8.1.2**	Test hypotheses that pertain to the content under study.
All lessons	**8.1.3**	Describe how if more than one variable changes at the same time in an experiment, the outcome of the experiment may not be attributable to a change in any single variable.
All lessons	**8.1.4**	Explain why accuracy and openness in record keeping and replication are essential for maintaining an investigator's credibility with other scientists and society.
2, 3, 4	**8.1.5**	Write clear step-by-step instructions (procedural summaries) for conducting investigations.
All lessons	**8.1.6**	Participate in group discussions on scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, and expressing alternative positions.
3, 4	**8.1.7**	Use tables, charts, and graphs in making arguments and claims in presentations about lab work.
3, 4	**8.1.9**	Explain why arguments may be invalid if based on very small samples of data, biased samples, or experiments in which there was no control sample.
1	**8.1.10**	Identify and criticize the reasoning in arguments in which fact and opinion are intermingled or the conclusions do not follow logically from the evidence given, an analogy is not apt, no mention is made of whether the control group is very much like the experimental group, or all members of a group are implied to have nearly identical characteristics that differ from those of other groups.
Washington, D.C. Mathematics Learning Standards: Grades 6, 7, 8		
Grade 6		
Lesson	**Standard**	**Description**
3, 4	**6.NSO-N.1**	Explain the properties of and compute with rational numbers, expressed in a variety of forms.

3, 4	**6.NSO-C.8**	Select and use appropriate operations to solve problems involving addition, subtraction, multiplication, division, and positive integer exponents with whole numbers and with positive fractions, mixed numbers, decimals, and percentages.
3, 4	**6.NSO-C.10**	Accurately and efficiently add, subtract, multiply, and divide (with multidigit divisors) whole numbers and positive decimals.
3	**6.PRA.9**	Produce and interpret graphs that represent the relationship between two variables (*x* and *y*) in everyday situations.
Grade 7		
Lesson	**Standard**	**Description**
3, 4	**7.NSO-C.11**	Demonstrate an understanding of the properties of arithmetic operations on rational numbers (integers, fractions, and terminating decimals); convert terminating decimals into reduced fractions.
3, 4	**7.NSO-C.12**	Select and use appropriate operations — addition, subtraction, multiplication, division — to solve problems with rational numbers and negative integers.
3, 4	**7.PRA.1**	Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions (e.g., compounding).
1	**7.M.1**	Select, convert (between systems of measurement), and use appropriate units of measurement or scale.
3, 4	**7.DASP.2**	Select, create, interpret, and use various tabular and graphical representations of data (e.g., circle graphs, Venn diagrams, stem-and-leaf plots, histograms, tables, and charts).
3, 4	**7.DASP.3**	Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling).
Grade 8		
Lesson	**Standard**	**Description**
3, 4	**8.NSO-N.1**	Explain the properties of and compute with real numbers expressed in a variety of forms.
3, 4	**8.NSO-C.15**	Select and use appropriate operations — addition, subtraction, multiplication, division, and positive integer exponents — to solve problems with rational numbers, including negative rationales.
3, 4	**8.PRA.1**	Use tables and graphs to represent and compare linear growth patterns. In particular, compare rates of change and *x*- and *y*-intercepts of different linear patterns.
3, 4	**8.PRA.8**	Explain and analyze — both quantitatively and qualitatively, using pictures, graphs, charts, and equations — how a change in one variable results in a change in another variable in functional relationships.
3, 4	**8.DASP.2**	Select, create, interpret, and use various tabular and graphical representations of data (e.g., scatterplots, box-and-whisker plots).
3, 4	**8.DASP.3**	Recognize practices of collecting and displaying data that may bias the presentation or analysis.
Washington, D.C. Reading / English Language Arts Learning Standards: Grades 6, 7, 8		

Grade 6		
Lesson	**Standard**	**Description**
All lessons	**6.LD-D.1**	Apply understanding of agreed-upon rules and individual roles to make decisions, including eliciting and considering suggestions from each group member, defining individuals' roles and responsibilities, and coming to consensus.
All lessons	**6.LD-Q.4**	Restate and execute multistep oral instructions and directions.
1, 3, 4	**6.LD-V.8**	Use such clues as definition, example, and restatement to determine the meanings of unfamiliar words and words with multiple meanings in context.
2, 3, 4	**6.IT-A.6**	Recognize arguments for and against an issue.
All lessons	**6.W-E.2**	Write explanations of a process that: group ideas and place them in logical order and include details to ensure the process is understandable.
3, 4	**6.W-E.3**	Write research reports that: frame a key question about an issue or situation, group ideas and place them in logical order, and include facts and details that illuminate the main ideas.
All lessons	**6.EL.6**	Spell frequently misspelled words correctly according to usage (e.g., *their, they're, there*).
Grade 7		
Lesson	**Standard**	**Description**
All lessons	**7.LD-D.1**	Know and apply rules for formal and informal discussions, including planning agendas, setting time limits for speakers, and taking votes on key issues.
All lessons	**7.LD-Q.2**	Ask probing questions to elicit information, including questions about the evidence that supports the speaker's claims and conclusions.
1, 3, 4	**7.LD-V.8**	Use such clues as cause and effect and comparison and contrast to identify the meaning of unfamiliar words and words with multiple meanings in context.
All lessons	**7.IT-DP.4**	Respond appropriately to a set of instructions and complete a task.
All lessons	**7.IT-DP.5**	Determine what information (e.g., steps in directions, legend, supplies needed, illustrations, diagram, sequence) is missing or extraneous in document and procedural text.
All lessons	**7.R.1**	Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual and group projects.
3, 4	**7.W-E.2**	Write summaries of passages that: group related ideas and place them in logical order, contain main ideas and significant details of the passage, and reflect the underlying meaning of the source.
Grade 8		
Lesson	**Standard**	**Description**
All lessons	**8.LD-D.1**	Identify techniques to improve productivity of group discussions, including setting clear goals, understanding the purpose of the team project and the ground rules for decision making, and setting deadlines.

1, 3, 4	**8.LD-V.9**	Monitor text for unknown words or words with novel meanings, using word, sentence, and paragraph clues to determine meaning.
All lessons	**8.IT-E.1**	Compare (and contrast) the central ideas, problems, or situations from readings on a specific topic selected to reflect a range of viewpoints.
All lessons	**8.IT-DP.4**	Evaluate the adequacy of details and facts to achieve a specific purpose.
All lessons	**8.R.1**	Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual and group projects.
All lessons	**8.W-E.2**	Write coherent multi-paragraph compositions (including compare-and-contrast essays) that: include a thesis statement, use logical organization, make effective use of detail and rhetorical devices, and include variety in sentence structure and transition sentences to link paragraphs.
All lessons	**8.EL.7**	Spell correctly, including commonly confused words (its/it's, affect/effect) and irregular plurals (e.g., sheep).

National Health Education Standards – Grades 6 – 8: cited from pre-publication document of National Health Education Standards, Pre K-12, American Cancer Society, December 2005 – August 2006

Lesson	Standard	Performance Indicator
3, 4	**1.8.1**	Analyze the relationship between healthy behaviors and personal health.
3	**1.8.3**	Analyze how the environment impacts personal health.
4	**1.8.5**	Describe ways to reduce or prevent injuries and other adolescent health problems.
3, 4	**1.8.7**	Describe the benefits and barriers to practicing healthy behaviors.
3, 4	**1.8.8**	Examine the likelihood of injury or illness if engaging in unhealthy behaviors.
3, 4	**1.8.9**	Examine the potential seriousness of injury or illness if engaging in unhealthy behaviors.
3	**2.8.3**	Describe how peers influence healthy and unhealthy behaviors.
3	**2.8.8**	Explain the influence of personal values and beliefs on individual health practices and behaviors.
3, 4	**2.8.9**	Describe how some health risk behaviors can influence the likelihood of engaging in unhealthy behaviors.
3, 4	**2.8.10**	Explain how school and public health policies can influence health promotion and disease prevention.
3, 4	**3.8.1**	Analyze the validity of health information, products, and services.
3, 4	**3.8.4**	Describe situations that may require professional health services.
3, 4	**4.8.1**	Apply effective verbal and nonverbal communication skills to enhance health.
3	**5.8.1**	Identify circumstances that can help or hinder healthy decision-making.
3, 4	**5.8.2**	Determine when health-related situations require the application of a thoughtful decision-making process.
3, 4	**5.8.3**	Distinguish when individual or collaborative decision-making is appropriate.
3, 4	**5.8.5**	Predict the potential short and long-term impact of each alternative on self and others.

4	**5.8.6**	Choose healthy alternatives over unhealthy alternatives when making a decision.
3, 4	**5.8.7**	Analyze the outcomes of a health-related decision.
3, 4	**7.8.3**	Demonstrate behaviors to avoid or reduce health risks to self and others.
3, 4	**8.8.1**	State a health enhancing position on a topic and support it with accurate information.
4	**8.8.2**	Demonstrate how to influence and support others to make positive health choices.
4	**8.8.4**	Identify ways that health messages and communication techniques can be altered for different audiences.